REMARKS

I. Introduction

By the present Amendment, claim 8 has been amended. No claims have been added or cancelled. Accordingly, claims 8-10 and 12 remain pending in the application. Claim 8 is independent.

II. Office Action Summary

In the Office Action of January 5, 2009, claims 8, 10, and 12 were rejected under 35 USC §103(a) as being unpatentable over Japanese Patent Publication No. JP 2002-063927 to Yamamoto et al. ("Yamamoto") in view of U.S. Patent Application No. 2004/0095023 to Jacobson et al. ("Jacobson"). Claim 9 was rejected under 35 USC §103(a) as being unpatentable over Yamamoto in view of Jacobson, and further in view of U.S. Patent Application No. 2002/0131285 to Kawakami and U.S. Patent Application No. 2003/0159865 to Schmidt. These rejections are respectfully traversed.

III. Interview

Applicants would like to thank Examiner Parries for the courtesy and cooperation extended during the interview conducted on June 1, 2009. During the interview, Applicants discussed proposed amendments to independent claim 8. Applicants explained that first control system controls the third power converter so that the calculated receive power (PD) does not exceed the power threshold receive value (PD*). Applicants further indicated that the second control system calculates the load power (PL) using equation 1, and outputs the load power to the filter to determine an average value (PLF) of the load power in order to control the output of

the fuels cells in a slow and progressive manner. It was indicated that the claims were not clearly specify such features, or the manner in which the third power converter can be controlled to effect the load power. Various proposals were discussed for amending the claim, but no agreements were reached.

IV. Rejections under 35 USC §103

In rejecting the claims, the Office Action indicates that Yamamoto discloses a fuel cell system that includes a first converter connected to an electric power system, a set of fuel cells connected to a second converter which outputs to a DC circuit, a secondary battery connected to the DC circuit through a third converter and the second converter, and a load connected in parallel with the first converter. The Office Action indicates that Yamamoto discloses a control unit that controls the functions of all devices in the system, as well as a current sensor which detects the current from the fuel cells. Furthermore, the Office Action indicates that Yamamoto discloses the secondary battery outputting a power value via the third converter corresponding to the power value that the receiving power exceeds the preset receiving power value due to the increase in the load power.

The Office Action admits that Yamamoto fails to disclose detecting the currents and voltages, and calculating the power at particular points in the circuit. Jacobson is relied upon for teaching voltage and current sensors in each segment of a system and sending those values to the control unit, as well as calculating the power in each segment using the current and voltage values obtained via the sensors. The Office Action concludes that it would have been obvious to have the current and voltage sensor in each segment of the system so that the controller will have information needed to accurately maintain the output power necessary to

power the system, and to quickly determine where a problem/fault lies. The Office Action further admits that Yamamoto fails explicitly disclose the second power converter outputting power so that it approaches the average value of the load power. However, this was considered nothing more than discovering the optimum or workable ranges, thus only requiring ordinary skill in the art. Applicants respectfully disagree.

By the present Amendment, Applicants have amended independent claim 8 to better define the invention and incorporate features that are not believed to be shown or suggested by the art of record. As amended, independent claim 8 defines a fuel cell system control unit that comprises:

> a first power converter electrically connected to an electric power system;
>
> an electric load connected to an electric line which ties the electric power system and the first power converter;
>
> a set of fuel cells connected to a DC circuit of said first power converter through a second power converter;
>
> a secondary battery connected to said DC circuit through a third power converter;
>
> a system voltage detecting means which detects an AC voltage on the power system and outputs its detected value;
>
> a receiving current detector for detecting the receiving current which is total of a current flowing through said first power converter and a current flowing through an the electric load;
>
> means for calculating a receiving electric power based on the receiving current detected by said receiving current detector and the system voltage detected by said system voltage detecting means;
>
> means for controlling said third power converter so that said receiving power does not exceed a receiving power threshold value;
>
> means for calculating the output power of the secondary battery;
>
> means for calculating the output power of the set of fuel cells;

means for calculating the load power which the load consumes based on the receiving power, the output power of the secondary battery, and the output power of the set of fuel cells;

means for calculating an average value of the load power by filtering the load power calculated;

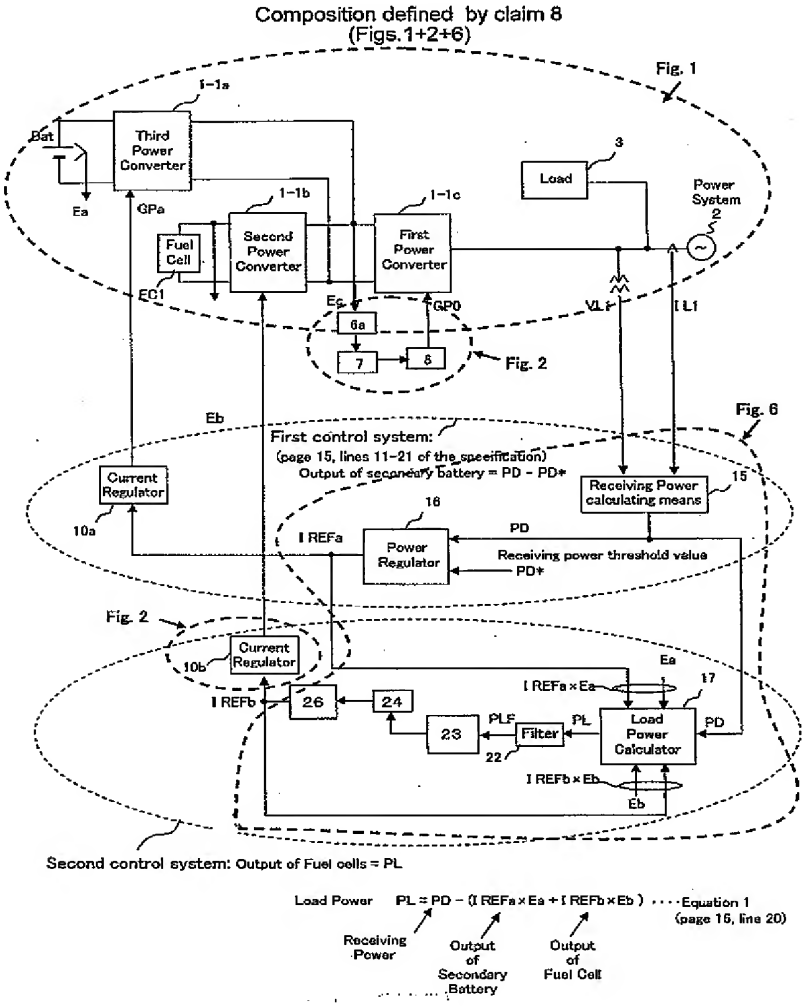
means for controlling the second power converter so that the output power of the set of fuel cells approaches the average value of load power; and

means for controlling the first electric power converter so that a DC side voltage of the first electric power converter approaches a predetermined DC voltage instruction value.

The fuel cell control unit of independent claim 8 includes a first power converter that is electrically connected to an electric power system, an electric load that is connected to an electric line which ties the electric power system and the first power converter, a set of fuel cells connected to a DC circuit of the first power converter through a second power converter, a secondary battery connected to the DC circuit through a third converter, and a system voltage detecting means for detecting an AC voltage on the power system and outputting its detected value. A receiving current detector is provided for detecting the receiving current which is a total of the current flowing through the first power converter and the current flowing through the electric load. The fuel cell control unit includes means for calculating a receiving electric power based on the receiving current detected by the receiving current detector and the system voltage detected by the system voltage detecting means, as well as means for controlling the third power converter so that the receiving power does not exceed a receiving power threshold value. The fuel cell control unit further includes means for calculating the output power of the secondary battery; means for calculating the output power of the set of fuel cells; means for calculating the average load power which the load consumes based on the receiving

power, the output power of the secondary battery, and the output power of the set of fuel cells; means for calculating an average value of the load power by filtering the load power calculated; and means for controlling the second power converter so that the output power of the set of fuel cells approaches the average value of the load power. Furthermore, according to independent claim 8, a means is provided for controlling the first electric power converter so that the DC side voltage of the first electric power converter approaches a predetermine DC voltage instruction value.

In order to better describe the features of the present invention, Applicants have prepared the following Sketch which combines elements shown in Figs. 1, 2, and 6.



According to independent claim 8, the voltage control system of the first electric power converter maintains the voltage of the DC side of the first electric power converter at a predetermined value. Accordingly, the output electric power of the fuel cells or the secondary battery being disconnected with either the second or third electric power converter allows the first electric power converter to pass and automatically supply power to the load side. Thus, the output electric power of the second power converter is equivalent to the output electric power of the fuel cells, while the output electric power of the third power converter is equivalent to the output electric power of the secondary battery. By controlling the output electric power of either the second or third power converter, it is possible to correspondingly control the output electric power of the fuel cells or the secondary battery. As illustrated in the Sketch, the first control system controls the third power converter so that the calculated receive power (PD) does not exceed the power threshold receive value (PD*). Furthermore, since the third power converter is controlled by the first control system so that the calculated receive power does not exceed the power threshold receive value, if the load increases, the receive power will also increase and tend to exceed the power threshold receive value. Thus, the third power converter causes the output power of the battery to increase and supply power to the load side so that the receive power does not exceed the power threshold receive value.

During the interview, it was indicated that the claims did not clearly specify how the third power converter can be controlled to effect the load power. Furthermore, it was suggested that the first power converter appears to have greater control over the load power.

By the present Amendment, however, independent claim 8 has been amended to better clarify the manner in which the third power converter can be controlled to effect the load power. Applicants respectfully submit that unless the first electric power converter has an associated voltage control system, there is no indication or suggestion that the output electric power of the fuel cells or the secondary battery pulled out by the second or third electric power converter can be supplied to the load side. Consequently, it is entirely possible to control the third power converter to effect the load power.

It is therefore respectfully submitted that the newly incorporated features of independent claim 8 are not shown or suggested by the art of record.

Claims 9, 10, and 12 depend from independent claim 8, and are therefore believed allowable for at least the reasons set forth above with respect to independent claim 8. In addition, these claims each introduce novel elements that independently render them patentable over the art of record.

V. Conclusion

For the reasons stated above, it is respectfully submitted that all of the pending claims are now in condition for allowance. Therefore, the issuance of a Notice of Allowance is believed in order, and courteously solicited.

If the Examiner believes that there are any matters which can be resolved by way of either a personal or telephone interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

AUTHORIZATION

Applicants request any shortage or excess in fees in connection with the filing of this paper, including extension of time fees, and for which no other form of payment is offered, be charged or credited to Deposit Account No. 01-2135 (Case: 520.43324X00).

Respectfully submitted,
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